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EXAMINER

HERNANDEZ, NELSON D

ART UNIT PAPER NUMBER

2612

DATE MAILED: 01/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/022,377

Applicant(s)

KONDO ET AL.

Examiner

Nelson D. Hernandez

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13, 15 and 16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 15 and 16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The Examiner acknowledges the amendments made on the claims filed October 24, 2005. Claim 1 has been amended. Claims 14 and 17-21 have been cancelled.

Response to Arguments

2. **Claim 1** has been amended to include the limitations of claim 14 that was indicated to have allowable subject matter if presented including the limitations of claim 1 in the previous Office Action mailed July 24, 2005. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art.

3. This Office Action is made Final due to Applicant's added claims 14-21 filed on February 22, 2005.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 1, 2, 4, 6-9, 12, 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe, US Patent 6,522,356 B1 in view of Nakazato, US Patent 5,592,575 and further in view of Fujimura, US Patent 6,900,838 B1.**

Regarding claim 1, Watanabe discloses a solid-state image pickup apparatus (Figs. 7, 9, 13 and 15) comprising: a solid state image pickup device having a number of color pixels disposed in a plurality of rows and columns in a pixel shift layout (See figs. 1A, 1B and 1C) and generating and outputting pixel signals, said number of color pixels including at least three kinds of color pixels, color pixels of one of said at least three kind being distributed in a square lattice pattern (See figs. 1C, 7, 9, 13 and 15) aligned in row and column directions (Col. 6, lines 1-32; col. 8, lines 1-26 and lines 45-64; col. 11, lines 28-61; col. 13, lines 16-51).

Watanabe fails to teach a first signal processing unit for generating output pixel signals by using signals based on said pixel signals, said first signal processing unit generating a part of output pixel signals directly from signals based on pixel signals of the color pixels of said one kind and generating another part of output pixel signals through interpolation process using signals based on pixel signals of color pixels of another of said at least three kinds; and that for each output pixel signal, the color pixels used in the interpolation process are located in rows above and below a row containing the colors pixels of said one kind used in generating said output pixel signal, respectively.

However, Nakazato teaches a solid state image pickup device having a number of color pixels disposed in a plurality of rows and columns in a pixel shift layout (See fig. 2) and generating and outputting pixel signals, said number of color pixels including at least three kinds of color pixels (Red, Green and Blue, see fig. 2) wherein said device

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comprises an image processing circuit (Fig. 1: 5) which performs an interpolation process to obtain the value of the color pixel different from the pixel in certain location (i.e. calculating a red or blue pixel in a green pixel location) (Col. 4, lines 16-38; col. 5, lines 16-26). Generating a part of output pixel signals directly from signals based on pixel signals of the color pixels of one kind is inherent in Nakazato since the color that do not need to be calculated are transfer directly from the image sensor.

Therefore, taking the combined teaching of Watanabe in view of Nakazato as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Watanabe by having a signal processing unit for generating output pixel signals by using signals based on the pixel signals, said signal processing unit generating a part of output pixel signals directly from signals based on pixel signals of the color pixels of said one kind and generating another part of output pixel signals through interpolation process using signals based on pixel signals of color pixels of another of said at least three kinds. Doing so would enable the solid-state image pickup apparatus to form high-resolution images as suggested by Nakazato (Col. 4, lines 16-38).

The combined teaching of Watanabe in view of Nakazato fails to teach that for each output pixel signal, the color pixels used in the interpolation process are located in rows above and below a row containing the colors pixels of said one kind used in generating said output pixel signal, respectively.

However, using color pixels of rows above and below of the same color of a pixel to be calculated in an interpolation process is well known in the art as taught by

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Fujimura. Fujimura teaches an interpolation process wherein when calculating the color signal for the pixels (i.e. G_{22} as shown in figs. 1A, 1B, 4B and R_{23} in fig 4D) the color pixels used for the interpolation process are pixels located in rows above and below of the row of the pixel to be calculated (Col. 1, lines 47-60; col. 3, lines 1-17; col. 7, lines 25-48; col. 8, lines 1-16).

Therefore, taking the combined teaching of Watanabe in view of Nakazato in view of Fujimura as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the solid-state image pickup apparatus in Watanabe by using color pixels of rows above and below of the same color of a pixel in the interpolation process. Doing so would produce a high resolution, full color image, which is determined by using multiple pixel regions.

Regarding claim 2, Watanabe discloses that the at least three kinds of color pixels are red color pixels, green color pixels and blue color pixels (See figs. 1C, 7, 9, 13 and 15) (Col. 6, lines 1-32; col. 8, lines 1-26 and lines 45-64; col. 11, lines 28-61; col. 13, lines 16-51).

Regarding claim 4, Watanabe teaches the same as in claim 2. Therefore, grounds for rejecting claim 2 apply here.

Regarding claim 6, limitations can be found in claim 1.

Regarding claim 7, the combined teaching of Watanabe in view of Nakazato and further in view of Fujimura teaches that the signal-processing unit performs interpolation processes by using signals based on pixel signals of two color pixel rows sandwiching one color pixel row and generates output pixel signals for a reproduction

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pixel row in a reproduction image corresponding to the sandwiched one color pixel row (See Nakazato, col. 4, lines 16-38).

Regarding claim 8, Watanabe teaches that two color pixels of another kind and two color pixels of the other kind are distributed for each of color pixels of said one kind thereabout respectively (See figs. 1C, 7, 9, 13 and 15) (Col. 6, lines 1-32; col. 8, lines 1-26 and lines 45-64; col. 11, lines 28-61; col. 13, lines 16-51).

Regarding claim 9, Watanabe teaches that each two color-pixels of a same kind are disposed with an associated color pixel of said one kind intervening there between (See figs. 1C, 7, 9, 13 and 15) (Col. 6, lines 1-32; col. 8, lines 1-26 and lines 45-64; col. 11, lines 28-61; col. 13, lines 16-51).

Regarding claim 12, Watanabe teaches a vertical charge transfer element (Figs. 7: 4, 9: 4, 13: 4 and 15: 4) provided for each color pixel column, each said vertical charge transfer element being electrically connected to each color pixel of a corresponding color pixel column (Col. 8, lines 1-26 and lines 45-64; col. 11, lines 28-61; col. 13, lines 16-51).

Regarding claim 13, Watanabe teaches a horizontal charge transfer element (Figs. 7: 5, 9: 5, 13: 5 and 15: 5) electrically connected to each vertical charge transfer element (Figs. 7: 4, 9: 4, 13: 4 and 15: 4) and an output amplifier (Figs. 7: 8, 9: 8, 13: 8 and 15: 8) electrically connected to the horizontal charge transfer element (Col. 8, lines 1-26 and lines 45-64; col. 11, lines 28-61; col. 13, lines 16-51).

Regarding claim 15, limitations can be found in claim 1.

6. Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe, US Patent 6,522,356 B1 and Nakazato, US Patent 5,592,575 in view of Fujimura, US Patent 6,900,838 B1 and further in view of Shiraishi, US Patent 5,280,347.

Regarding claim 3, the combined teaching of Watanabe in view of Nakazato and further in view of Fujimura fails to teach that at least three kinds of color pixels include complementary color pixels.

However, Shiraishi teaches a color image-sensing device (Fig. 9) comprising a solid state image pickup device (Fig. 9: 1) having a number of color pixels disposed in a plurality of rows and columns in a pixel shift layout (Fig. 7) and generating and outputting pixel signals, said number of color pixels including at least three kinds of color pixels, wherein said at least three kinds of color pixels include complementary color pixels (Cyan, Yellow, Magenta and Green; see fig. 7) (Col. 6, lines 18-34).

Therefore, taking the combined teaching of Watanabe and Nakazato in view of Fujimura and further in view of Shiraishi as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the solid state image pickup apparatus by having a solid state image pickup device having a number of color pixels disposed in a plurality of rows and columns in a pixel shift layout and generating and outputting pixel signals, said number of color pixels including at least three kinds of color pixels, wherein said at least three kinds of color pixels include complementary color pixels. Doing so would help the solid-state image pickup device to

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increase the amount of light passing through to the sensor, providing better efficiency compared to a RGB system.

Regarding claim 5, the combined teaching of Watanabe and Nakazato in view of Fujimura and further in view of Shiraishi teaches that color pixels of said one kind are green color pixels (See Shiraishi, fig. 7, col. 6, lines 18-34).

7. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe, US Patent 6,522,356 B1 and Nakazato, US Patent 5,592,575 in view of Fujimura, US Patent 6,900,838 B1 and further in view of Horng, US Patent 5,663,759.

Regarding claim 10, the combined teaching of Watanabe in view of Nakazato and further in view of Fujimura fails to teach a second signal-processing unit for generating output pixel signals by performing interpolation processes using signals based on pixel signals of said number of color pixels.

However, Horng teaches a processor (Fig. 1) for a digital camera comprising a first signal processing circuit (Fig. 1: 30) and second signal processing unit (Fig. 1: 40) for generating output pixel signals by performing interpolation processes using signals based on pixel signals of said number of color pixels (Col. 2, line 51 – col. 3, line 6; col. 3, lines 21-52; col. 4, lines 12-48).

Therefore, taking the combined teaching of Watanabe and Nakazato in view of Fujimura and further in view of Horng as a whole, it would have been obvious to one of ordinary skill in the art to modify the solid-state image pickup apparatus by having a second signal processing unit (Fig. 1: 40) for generating output pixel signals by

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performing interpolation processes using signals based on pixel signals of said number of color pixels. Doing so would help the solid-state image pickup apparatus to produce full picture zoom, partial picture zoom, still picture, and mosaic functions as suggested by Horng (Col. 1, lines 47-57).

Regarding claim 11, the combined teaching of Watanabe and Nakazato in view of Fujimura and further in view of Horng teaches that the second signal processing unit generates output pixel signals corresponding to a reproduction image having the number of reproduction pixels larger than the total number of said color pixels as in claim 10 (See Horng, col. 2, line 51 – col. 3, line 6; col. 3, lines 21-52; col. 4, lines 12-48).

8. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe, US Patent 6,522,356 B1 and Nakazato, US Patent 5,592,575 in view of Fujimura, US Patent 6,900,838 B1 and further in view of Prakash, US 2002/0076114 A1.

Regarding claim 16, the combined teaching of Watanabe in view of Nakazato and further in view of Fujimura fails to teach that the number of output pixels is half the number of color pixels.

However, Prakash discloses a method of down-sampling pixel signals in an image received from an image sensor by using low pass reduction wherein the number of output pixels is half the number of color pixels (Page 2, ¶ 0016; page 3, ¶ 0039).

Therefore, taking the combined teaching of Watanabe and Nakazato in view of Fujimura and further in view of Prakash as a whole, it would have been obvious to one

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of ordinary skill in the art at the time the invention was made to modify the solid-state image pickup apparatus by down-sampling the pixel signals in an image received from an image sensor by using low pass reduction to reduce the number of output pixels to a half of the number of color pixels. The motivation to do so would have been to display the image data in a display device with less resolution such as an electronic viewfinder.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Contact

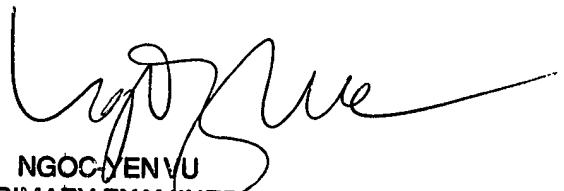
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nelson D. Hernandez whose telephone number is (571) 272-7311. The examiner can normally be reached on 8:30 A.M. to 6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ngoc Yen Vu can be reached on (571) 272-7320. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nelson D. Hernandez
Examiner
Art Unit 2612

NDHH
January 26, 2006


NGOC YEN VU
PRIMARY EXAMINER